Earth and Environmental Sciences - Graduate Programs

Program Objectives

The MS in Earth and Environmental Sciences has four options: an Environmental Science Option; a Geoscience Option; a Professional Environmental Science Option; and a Petroleum Geoscience Option.

The Environmental Science Option provides graduate students with an integrated, multidisciplinary education, requiring a breadth of understanding and mastery of a spectrum of scientific and engineering principles. The thesis option, designed for those interested in an in-depth experience in some particular topic, and a non-thesis option are available. All new students are admitted into the non-thesis option. During the first year, students may transfer to the thesis option after obtaining a faculty thesis supervisor. A thesis supervisor is not guaranteed.

The Geoscience Option is a two year program with specializations in stratigraphy, petrology, paleontology, sedimentology, structural geology, Geomechanics, plate tectonics, computer modeling, hydrology, geochemistry and paleoclimatology. Students in this program are prepared for additional graduate work at the PhD level, or for positions in industry and government. Thesis or non thesis options are available. However, all new students are admitted into the non-thesis option. During the first year, students may transfer to the thesis option after obtaining a faculty thesis supervisor. A thesis supervisor is not guaranteed.

The Environmental Science Professional Option is a Professional Master's Degree for those interested in a career in Environmental Science. Instead of a thesis, students participate in a mentoring program, take a course in project economics, work as an intern or in a part time job in the Environmental Science Profession, and course experiences involving business ethics, teamwork, a small research project, and communication. This is a non thesis program.

The Petroleum Geoscience Professional Option is a Professional Masters Degree for those interested in a career in the Petroleum Industry. In addition to core geology courses, students are required to participate in a networking program with industry professionals, work as an intern or in a part time job in petroleum geoscience, take a course in project economics, and participate in course activities that emphasize business ethics, teamwork and communications. A thesis research project is required. All students are initially admitted to the Geoscience non-thesis option. During the first year, students may transfer to the Petroleum Geoscience option after obtaining a faculty thesis supervisor. A thesis supervisor is not guaranteed.

The PhD in Earth and Environmental Sciences. The program leading to the Doctor of Philosophy degree in Earth and Environmental Sciences is designed primarily to prepare doctoral-level students for research careers in industry, government or academic institutions. Students carry out independent research and acquire practical knowledge of the type of research conducted and the constraints (both practical and philosophical) under which such research is conducted. The areas of research are interdisciplinary using the Earth's environment, interpreted broadly, as the theme. Research normally comes from the disciplines of Geoscience, Biology, Chemistry and Engineering, but contributions from other disciplines are welcome. The program is designed to provide graduate students an integrated, multidisciplinary education, requiring a breadth of understanding and mastery of a spectrum of scientific and engineering principles. Among the goals is to provide students who have earned engineering or science undergraduate degrees a common ground for interdisciplinary communication, an understanding of the environment, and competence in a research area that will enable them to evaluate complex environmental problems.

Admission

Students applying for MS or PhD degrees should apply to the Graduate School for regular admission to a particular degree program at http://www.uta.edu/admissions/graduate/index.php. (http://www.uta.edu/admissions/graduate/)

CATEGORIES OF ADMISSION

Unconditional - all the admission criteria are met and there are no conditions placed on continued enrollment in the program.

Probationary - Applicants who do not meet the standards for unconditional admission may be considered for probationary admission after careful examination of their application materials. Probationary admission normally requires that the applicant receive a B or better in their first 12 hours of graduate coursework at UT Arlington, and/or make up undergraduate deficiencies.

Deferred and Provisional Admission - A deferred admission may be granted when an application is incomplete or when a denied decision is not appropriate. An applicant unable to supply all required documentation prior to the admission deadline but whom otherwise appears to meet admission requirements may be granted provisional admission.

INTERNATIONAL STUDENTS

An applicant whose native language is not English must demonstrate a sufficient level of skill with the English language to assure success in graduate studies. Applicants must submit a score of at least 550 on the paper-based TOEFL, a score of at least 213 on the computer-based TOEFL, a minimum
score of 40 on the TSE, a minimum score of 6.5 on the IELTS, or a minimum TOEFL iBT total score of 79 with sectional scores that meet or exceed 22 for the writing section, 21 for the speaking section, 20 for the reading section, and 16 for the listening section to.

An applicant holding either a bachelor’s or a master’s degree from a regionally accredited U.S. college or university is not required to submit a TOEFL, TOEFL iBT, TSE or IELTS score for admission purposes. Any other waivers of the score requirements must be recommended by the applicant’s Graduate Advisor and approved by the Dean of Graduate Studies.

FINANCIAL AID

Students that are unconditionally admitted into the MS or PhD programs can also apply for available scholarships and/or Graduate Teaching Assistantships. Award of scholarships or Assistantships will be based on consideration of the same criteria utilized in admission decisions. To be eligible, candidates must have a GPA of 3.0 in their last 60 undergraduate credit hours plus any graduate credit hours as calculated by the Graduate School, and must be enrolled in a minimum of 9 hours of coursework in both long semesters to retain their Financial Aid. To be eligible for a Graduate Teaching Assistantship, a non-native English speaker must receive a TOELF iBT score of at least 23, or an IELTS score of at least 7 on the speaking section of those exams. Applications Scholarships or Teachings Assistantships must be submitted over the internet at https://uta.academicworks.com/. Deadline is March 1st for the following academic year starting in August.

DENIAL OF ADMISSION

A candidate may be denied admission if they have less than satisfactory performance on a majority of the admission criteria described above.

Earth and Environmental Sciences Master's Program Admissions

For unconditional admission a student must meet the following requirements:

For the Environmental Science Options: A B.S. degree in biology, chemistry, geoscience, mathematics, or engineering with the following courses or their equivalent: 1 semester of introductory physics for science majors; 2 semesters of introductory chemistry for science majors; and Calculus I and II. Students with a Bachelor’s Degree in other sciences will also be considered, subject to satisfactory completion of deficiency courses.

For the Geoscience Options: A B.S. degree in an Earth Science discipline with the following courses or their equivalent: Mineralogy, Petrology, Structure, Stratigraphy/sedimentology, Field Geology and Geophysics or Paleontology. In addition, one semester of Biology, Calculus I and II, and a year of Chemistry and Physics is required.

For all Options:

1. A minimum undergraduate GPA of 3.0 on a 4.0 scale, as calculated by the Graduate School.
2. Graduate Record Examination (GRE) scores are used in conjunction with GPA’s. For example a person with a GPA below 3.0 will need a GRE score better than average. Masters students who have succeeded in the Earth and Environmental Science s Program typically score higher than the 60th Percentile on the verbal and quantitative portion of the GRE.
3. An applicant whose native language is not English must submit a score of at least 550 on the paper-based TOEFL, a score of at least 213 on the computer-based TOEFL, a minimum score of 40 on the TSE, a minimum score of 6.5 on the IELTS, or a minimum TOEFL iBT total score of 79 with sectional scores that meet or exceed 22 for the writing section, 21 for the speaking section, 20 for the reading section, and 16 for the listening section. However, an applicant whose native language is not English with a bachelor’s or a master’s degree from a regionally accredited U.S. college or university is not required to submit a TOEFL, TOEFL iBT, TSE or IELTS score for admission purposes.
4. Favorable letters of recommendation from people familiar with the applicant’s academic work.

Master's Degree Requirements

EARTH AND ENVIRONMENTAL SCIENCES MASTER’S DEGREE

There are additional requirements for all Master’s programs listed in this CATALOG under University Requirements and Policies.

Environmental Science Thesis Option

Core Courses

<table>
<thead>
<tr>
<th>General core courses</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td>EVSE 5303</td>
<td>SUSTAINABILITY ISSUES SEMINAR III</td>
</tr>
<tr>
<td>EVSE 5454</td>
<td>STATISTICS FOR EARTH AND ENVIRONMENTAL SCIENTISTS</td>
</tr>
</tbody>
</table>

Select one of the following engineering courses

| 3 |
|----------------------|---|
| CE 5321 | ENGINEERING FOR ENVIRONMENTAL SCIENTISTS |
| CE 5319 or CE 5328 | PHYSICAL-CHEMICAL PROCESSES II |

Select one of the following science courses

| 3 |
|----------------------|---|
| EVSE 5309 | ENVIRONMENTAL SYSTEMS-BIOLOGICAL ASPECTS |


EVSE 5310  ENVIRONMENTAL SYSTEMS-CHEMICAL ASPECTS
EVSE 5311  ENVIRONMENTAL SYSTEMS-GEOLOGICAL ASPECTS

Select one of the following in City, or Regional Planning:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>PLAN 5342</td>
<td>ENVIRONMENTAL POLICY</td>
</tr>
<tr>
<td>PLAN 5343</td>
<td>FOUNDATIONS OF ENVIRONMENTAL POLICY</td>
</tr>
<tr>
<td>PLAN 5351</td>
<td>TECHNIQUES OF ENVIRONMENTAL ASSESSMENT</td>
</tr>
</tbody>
</table>

Electives within one of the following departments: Biology, Chemistry, Earth and Environmental Sciences, Civil and Environmental Engineering, or Urban and Public Affairs

Two semesters of GEOL 5199 or EVSE 5199 - Seminar

EVSE 5698  THESIS

Total Hours 30

1  Students with less than 20 undergraduate hours in biology, chemistry, or geology will need to take a third environmental systems course as a deficiency. Students entering with a BS degree in one of these areas must take their two courses in the other areas.

### Environmental Science Non-Thesis Option

**Core Courses**

**General core courses**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>EVSE 5303</td>
<td>SUSTAINABILITY ISSUES SEMINAR III</td>
</tr>
<tr>
<td>EVSE 5454</td>
<td>STATISTICS FOR EARTH AND ENVIRONMENTAL SCIENTISTS</td>
</tr>
</tbody>
</table>

Select one of the following engineering courses

<table>
<thead>
<tr>
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<th>Title</th>
</tr>
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<tbody>
<tr>
<td>CE 5321</td>
<td>ENGINEERING FOR ENVIRONMENTAL SCIENTISTS</td>
</tr>
<tr>
<td>CE 5319</td>
<td>PHYSICAL-CHEMICAL PROCESSES II</td>
</tr>
<tr>
<td>or CE 5328</td>
<td>FUNDAMENTALS OF AIR POLLUTION</td>
</tr>
</tbody>
</table>

Select one of the following in science:

<table>
<thead>
<tr>
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<th>Title</th>
</tr>
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<tbody>
<tr>
<td>EVSE 5309</td>
<td>ENVIRONMENTAL SYSTEMS-BIOLOGICAL ASPECTS</td>
</tr>
<tr>
<td>EVSE 5313</td>
<td>ENVIRONMENTAL REGULATION OF CHEMICAL HAZARDS</td>
</tr>
<tr>
<td>EVSE 5311</td>
<td>ENVIRONMENTAL SYSTEMS-GEOLOGICAL ASPECTS</td>
</tr>
</tbody>
</table>

Select one of the following in City and Regional Planning

<table>
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<tr>
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<th>Title</th>
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</thead>
<tbody>
<tr>
<td>PLAN 5305</td>
<td>LAND USE, MANAGEMENT AND DEVELOPMENT</td>
</tr>
<tr>
<td>PLAN 5316</td>
<td>LAND USE PLANNING AND THE LAW</td>
</tr>
<tr>
<td>PLAN 5352</td>
<td>ENVIRONMENT ASSESSMENT POLICY &amp; PRACTICE</td>
</tr>
</tbody>
</table>

Electives within one of the following departments: Biology, Chemistry, Earth and Environmental Sciences, Civil and Environmental Engineering, or Urban and Public Affairs

EVSE Seminar

Two semesters of GEOL 5199 or EVSE 5199

EVSE 5395  MASTER’S PROJECT

Total Hours 30

1  Students with less than 20 undergraduate hours in biology, chemistry, or geology will need to take a third environmental systems course as a deficiency. Students entering with a BS degree in one of these areas must take their two courses in the other areas.

2  Must include at least 6 hours in department(s) outside that in which the first 9 hours of electives are taken.

### The Geoscience Thesis Option

**Core Courses**

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>GEOL 5454</td>
<td>STATISTICS FOR EARTH AND ENVIRONMENTAL SCIENTISTS</td>
</tr>
</tbody>
</table>

Select one of the following in engineering (or advisor approved):

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>CE 5321</td>
<td>ENGINEERING FOR ENVIRONMENTAL SCIENTISTS</td>
</tr>
<tr>
<td>IE 5304</td>
<td>ADVANCED ENGINEERING ECONOMY</td>
</tr>
</tbody>
</table>

Take two hours in the following seminar:

<table>
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</thead>
<tbody>
<tr>
<td>GEOL 5199</td>
<td>TECHNICAL SESSIONS</td>
</tr>
</tbody>
</table>

Advisor Approved Electives 15
The Geoscience Non-Thesis Option

Core Courses

GEOL 5454 STATISTICS FOR EARTH AND ENVIRONMENTAL SCIENTISTS 4
Select one of the following in engineering (or advisor approved):

CE 5321 ENGINEERING FOR ENVIRONMENTAL SCIENTISTS
IE 5304 ADVANCED ENGINEERING ECONOMY

take two hours in the following seminar:

GEOL 5199 TECHNICAL SESSIONS

Advisor Approved Electives

GEOL 5395 MASTER'S PROJECT 3

Total Hours

30

Environmental Science Professional Option

EVSE 5454 STATISTICS FOR EARTH AND ENVIRONMENTAL SCIENTISTS 4
Select one of the following Engineering Courses

CE 5321 ENGINEERING FOR ENVIRONMENTAL SCIENTISTS
IE 5304 ADVANCED ENGINEERING ECONOMY

Select one of the following in science:

EVSE 5309 ENVIRONMENTAL SYSTEMS-BIOLOGICAL ASPECTS 1
EVSE 5311 ENVIRONMENTAL SYSTEMS-GEOLGICAL ASPECTS 1
EVSE 5313 ENVIRONMENTAL REGULATION OF CHEMICAL HAZARDS 1

Select one of the following in City and Regional Planning:

PLAN 5305 LAND USE, MANAGEMENT AND DEVELOPMENT
PLAN 5316 LAND USE PLANNING AND THE LAW
PLAN 5352 ENVIRONMENT ASSESSMENT POLICY & PRACTICE

Professional Courses

Take each of the following courses:

EVSE 5120 ENVIRONMENTAL PROFESSIONAL MENTORING & BUSINESS ETHICS 1
EVSE 5199 SEMINAR IN ENVIRONMENTAL & EARTH SCIENCES 1
EVSE 5115 PROFESSIONAL EXPERIENCE 1
or EVSE 6197 RESEARCH IN ENVIRONMENTAL & EARTH SCIENCES

EVSE 5395 MASTER'S PROJECT 3

Other Electives

Electives within one of the following departments: Biology, Chemistry, Earth and Environmental Sciences, Civil and Environmental Engineering, or Urban and Public Affairs

Successful completion of the Master's Comprehensive Examination in final semester.

Total Hours

30

1 Students with less than 20 undergraduate hours in biology, chemistry, or geology will need to take a third environmental systems course as a deficiency. Students entering with a BS degree in one of these areas must take their two courses in the other areas.

Energy Geoscience Professional Option

Professional Courses

GEOL 5454 STATISTICS FOR EARTH AND ENVIRONMENTAL SCIENTISTS
GEOL 5180 PROFESSIONAL ORIENTATION AND BUSINESS ETHICS
or GEOL 5199 TECHNICAL SESSIONS
or GEOL 5190 GEOSCIENCE INTERNSHIP
GEOL 5151 TOPICS IN ENERGY AND EARTH RESOURCES
GEOL 5351 ENERGY RESOURCES FOR GEOSCIENTISTS

Three of the following geoscience courses:

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Earth and Environmental Sciences - Graduate Programs

GEOL 5342 MICROFOSSILS AND CARBONATE ROCKS
GEOL 5370 SEDIMENTARY SYSTEMS
GEOL 5371 BASIN ANALYSIS
GEOL 5373 RESERVOIR CHARACTERIZATION
GEOL 5374 SEISMIC INTERPRETATION
GEOL 5375 INTRODUCTION TO WELL LOG INTERPRETATION AND MAPPING

Two of the following electives: 8
GEOL 5450 CONTAMINANT HYDROGEOLOGY
GEOL 5405 METEOROLOGY AND CLIMATOLOGY
GEOL 5428 HYDROGEOLOGY
GEOL 5465 PHYSICAL OCEANOGRAPHY AND LIMNOLOGY
EVSE 5458 MACHINE LEARNING FOR EARTH AND ENVIRONMENTAL SCIENTISTS
GEOL 5395 MASTER’S PROJECT

Total Hours 30

Dual Degree Program

Dual master’s degrees can be arranged with any suitable program. By participating in a dual degree program, students may apply 6-18 total semester credit hours jointly to meet the requirements of both degrees, thus reducing the total number of hours which would be required to earn both degrees separately. The number of hours which may be jointly applied ranges from six to 18, subject to the approval of Graduate Advisors from both programs. Degree plans, thesis or professional report proposals and programs of work must be approved by Graduate Advisors from both programs. The successful candidate will be awarded both degrees rather than one joint degree.

To participate in the dual degree program, students must make separate application to each program and must submit a separate program of work for each degree. Those interested in the dual degree program should consult the appropriate Graduate Advisors for further information on course requirements. See also the statement on Dual Degree Programs in the general information section of this catalog.

Arrangements to offer a dual degree have already been made between Earth and Environmental Sciences and the Program in City and Regional Planning (M.C.R.P. degree), School of Urban and Public Affairs.

Admission Requirements

For unconditional admission a student must meet the following requirements:

1. A Masters Degree or at least 30 hours of graduate coursework in environmental science, biology, chemistry, geology, mathematics or engineering. Students with a Bachelor’s degree in biology, chemistry, geology, mathematics, or engineering will be considered for the B.S. to Ph.D. track if they meet the other requirements for admission to doctoral studies. Students with a Bachelor’s Degree in other sciences will also be considered, subject to satisfactory completion of courses to make up deficiencies.

2. A minimum graduate coursework GPA of 3.0 on a 4.0 scale, as calculated by the Graduate School.

3. Graduate Record Examination (GRE) scores are considered in admission decisions. Doctoral students who have succeeded in the Earth and Environmental Sciences Program typically score higher than the 60th percentile the verbal and the quantitative portion of the GRE.

4. For applicants whose native language is not English, a minimum score of 550 on the Test of English as a Foreign Language (or an equivalent score on a computer-based test) or a score of 40 on the Test of Spoken English.

5. Favorable letters of recommendation from people familiar with the applicant’s academic work and/or professional work.

6. A statement must be submitted to the program detailing the applicant’s specific research interests and identifying the faculty member who is requested as supervisor of the dissertation research.

7. Students may be considered for unconditional admission if further review of their transcripts, recommendation letters, correspondence or direct interactions with Earth and Environmental Sciences faculty, and statement of research interests indicates that they are qualified to enter the Doctoral Program.

Doctoral Degree Requirements

EARTH AND ENVIRONMENTAL SCIENCES DOCTORAL DEGREE

The Doctoral Program provides students with the interdisciplinary knowledge and skills to conduct independent research in Earth and Environmental Sciences. Students conduct dissertation research under the supervision of a faculty member in one of the participating departments (Biology, Chemistry, Earth and Environmental Sciences, Civil and Environmental Engineering, or Urban and Public Affairs). The supervising professor and a faculty committee assign courses in this primary area of emphasis to support the student’s research and professional goals. To provide interdisciplinary training, additional courses are assigned in a secondary area of emphasis.
If they have not already done so in their previous work, all Doctoral students must take one engineering course; two science courses; and one course in policy or planning.

Students who enter the Doctoral Program with a Master’s degree in a science or engineering field, or with 30 semester hours of graduate coursework, take a Diagnostic Examination in the first year of residence to evaluate this previous work. The student’s supervising committee must approve all courses taken to meet degree requirements.

Students who enter the Doctoral Program with a Bachelor’s degree take 30 semester hours of graduate coursework that includes Engineering, Science and Public Policy courses. These students are encouraged to take the diagnostic exam in their first year of enrollment. The student’s supervising committee must approve all courses taken to meet degree requirements.

Students may choose among any of the five participating units for their primary and secondary areas of emphasis. Course selection within these areas of emphasis is guided by the student’s supervising committee and must result in a cohesive program that supports the dissertation research.

Other requirements include:

1. Successful completion of the Diagnostic Examination at the end of the first year of residence.
2. Successful completion of the Comprehensive Examination, an oral defense of a research proposal to be pursued for the dissertation, and a specialization examination over areas of the student’s proposed research.
3. Demonstration of proficiency in one foreign language or a research tool such as advanced computer skills, statistics, or operations research.
4. Successful defense of the dissertation and acceptance of the dissertation by the supervising committee.